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SALMON STOCKS AND FISHERIES IN THE YUKON AREA, ALASKA, 1988

A Report to the Alaska Board of Fisheries
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[1]The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or achive basic uninterpreted data. To accommodate needs for up-to-date information, reports in this series may contain preliminary data.

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BACKGROUND

Area Boundaries and Legal Gear

The Yukon area includes all waters of the Yukon River drainage in Alaska and coastal waters from Canal Point light near Cape Stephens to the Naskonat Peninsula. For management purposes, the area is divided into six districts and 10 subdistricts (Figure 1). Commercial and subsistence fishing occurs along the entire 1,200 mile length of the Yukon River in Alaska and in the lower 220 miles of the Tanana River. The Lower Yukon area (Districts 1, 2, and 3) includes the coastal waters of the delta and that portion of the drainage from the mouth to Old Paradise Village (river mile 301). The Upper Yukon area (Districts 4, 5, and 6) is that portion of the drainage upstream of Old Paradise Village to the US/Canada border, including the Tanana River drainage. Commercial and subsistence fisheries also occur in Canada, with fishery management activities conducted by the Canadian Department of Fisheries and Oceans (DFO). Annual Yukon River drainage salmon harvests have exceeded 1.1 million fish since 1974 (Tables 1-5).

Legal commercial fishing gear consists of set and drift gill nets in the lower Yukon area and fishwheels and set gill nets in the upper Yukon area. Open skiffs powered by outboard motors are used to operate the fishing gear and to deliver fish to tenders or buying stations. Subsistence fishing gear commonly used to capture salmon includes gill nets and fishwheels.

Management Considerations

The objective of the Department's research and management program is to manage the various salmon runs for optimum sustained yield.

Subsistence has been designated by the legislature (State Law 151) as the highest priority among beneficial uses of fish and game resources. Except in areas where intensive commercial fisheries occur, the subsistence fishery is subject to few restrictions in order to give preference to subsistence users. The majority of Yukon River fishermen usually take salmon for both commercial and subsistence purposes in major commercial fishing areas. Therefore, it is necessary to place some restrictions on the subsistence fishery in order to enforce commercial fishing regulations. During the fishing season, however, substantially more subsistence fishing time is allowed than commercial fishing time.

Management is made difficult by the character of salmon runs, the nature of the various fisheries, and the river itself. Since most of the commercial fisheries have only developed or expanded in recent years, there is a lack of adequate escapement and return data on which to fully evaluate the effects of increased commercial harvests. The various Alaska fisheries, which are scattered over 1,400 river miles, harvest mixed stocks which may be several weeks and hundreds of miles from their spawning grounds. Because the Yukon River commercial fisheries harvest mixed stocks, some tributary populations may be under- or overharvested in relation to their actual abundance.

Research projects are underway and additional studies are planned, once additional funding becomes available, to obtain the biological information necessary for better management of the salmon runs. Current projects operated by the Department, United States Fish and Wildlife Service, or D.F.O. include: (1) chinook and chum salmon stock separation studies using scale pattern analysis and electrophoretic techniques, (2) side-scanning sonar, tower, or weir enumeration to obtain accurate daily and seasonal escapement estimates in important tributaries (Anvik, Andreafsky, Chandalar,

Fishing Branch and Sheenjek Rivers), (3) main river sonar study (near Pilot Station) to obtain estimates of total Yukon River salmon abundance, (4) main stem Tanana River fall chum salmon radio tagging to identify primary spawning locations, (5) chinook and fall chum salmon mark - and - recapture programs (Yukon Territories) and aerial surveys (all species) to estimate seasonal escapements, and (6) test fisheries in the delta area, near Ruby, and within the Tanana River which provide in-season run timing and abundance information.

Management of the Yukon River commercial salmon fishery must be conservative because of the difficulty in determining run size, harvesting of mixed stocks, increased effort and efficiency of the commercial fleet, allocation concerns, and the need to provide for upriver escapements and subsistence requirements. Important management techniques, in addition to the guideline harvest ranges include establishing gill net mesh-size restrictions (lower Yukon area), weekly fishing periods, and season closures. If it becomes apparent during the fishing season (based on analysis of commercial and test fish catch data and hydroacoustic abundance estimates) that the run is substantially smaller or larger than needed for escapement and subsistence requirements, commercial fishing time is adjusted through emergency order.

Status of Fishery, Stocks, and Management Strategies

All five species of Pacific salmon occur in the Yukon River, with chum salmon being the most abundant, followed by chinook, coho, pink, and sockeye salmon. Commercial salmon fishing (for chinook salmon) in the Yukon River dates back to 1918, but the multi-species salmon fishery did not become fully developed until the mid-1970's. In the Alaskan portion of the Yukon River for the period 1983-1987, the average commercial salmon harvest was 0.95 million fish and 194,000 lbs roe (Table 2). The harvest of male

summer chum salmon taken incidental to the roe-directed fishery is not included in this total. The average subsistence harvest for 1983-1987 was 541,000 fish (Table 3).

Approximately 800 commercial fishermen (665 in the 3 lower districts) and 25 processors participate in the fishery. The ex-vessel value of the commercial salmon catch averaged $6.6 million for the period 1983-1987. Approximately 1,500 fishing families from 37 communities with a total population of nearly 9,000 (not including the greater Fairbanks area) harvest salmon for subsistence within the Yukon River drainage in Alaska. Since statehood the Commercial Fisheries Division staff conducted post-season subsistence salmon harvest surveys and data analysis. Subsistence Division staff conducted subsistence surveys and data analysis in 1988.

Salmon run timing into the Yukon River is quite variable. Chinook salmon generally begin entering the river during late May or early June in response to spring weather conditions. The chinook salmon migration has usually passed through the lower river by the first week of July, being of short duration, while summer chum salmon are usually present in the lower river in significant numbers into July. Fall chum salmon generally begin entry into the river by the middle of July and are present into September. Coho salmon generally begin entry into the river by the end of the first week of August and entry continues into September.

Initiation of the commercial salmon fishery in the lower Yukon area occurs by emergency order in response to run timing, generally June 5-15. A guideline harvest range of 60,000-120,000 chinook salmon has been established for Districts 1 and 2, and a guideline harvest range of 1,800-2,200 chinook salmon has been established for District 3. Harvests toward the mid-point of the guideline harvest ranges should be expected if the run is of average magnitude. No

summer chum salmon guideline harvest range has been established. The commercial fishery is only opened after it has been determined (by monitoring test fishing and subsistence catches) that a sustained migration of chinook salmon is in progress and that the early portion of the run has passed through the lower river. Prior to the 1988 season, initial fishing periods occurred on a twice weekly, 24-hour period schedule using unrestricted mesh size gill nets directed toward the harvest of chinook salmon. During the 1986 and 1988 seasons the first commercial period was directed toward the harvest of summer chum salmon, by restricting gill nets to six inch maximum mesh size. Prior to the 1985 season it was only after the chinook salmon harvest goal had been achieved that mesh size restrictions were implemented to direct the harvest toward summer chum salmon. Since 1985, during years of high summer chum salmon abundance and early run timing restricted mesh size periods have been implemented to harvest available summer chum salmon prior to the end of the chinook salmon directed fishery. Management of the summer chum salmon fishery is greatly dependent on action taken toward chinook salmon since both species exhibit similar run timing.

In the upper Yukon area (Districts 4-6), commercial salmon fishing in District 4 is opened by emergency order between June 10 and June 25 and in Districts 5 and 6 the season opens June 15 by regulation. Individual chinook salmon guideline harvest ranges are in effect for each district with a combined harvest range of 5,550-6,950 fish. No summer chum salmon guideline harvest level is in effect. In District 4, summer chum salmon roe remains the primary product. Relatively poor flesh quality and high costs of transportation have combined to minimize the export of summer chum salmon from this district. These chum salmon, however, produce a very high quality caviar which has been the primary product of the fishery for several years. Fishing in the upper Yukon area has generally occurred twice weekly during 48-hour fishing periods, however,

beginning in 1988, District 6 fishermen operated during twice weekly 42-hour fishing periods.

The fall chum and coho salmon fishing season is established by emergency order. Fall chum salmon harvest levels are governed by guideline harvest ranges in the lower Yukon area (0-110,000 fish) and by combined fall chum and coho salmon guideline harvest levels in the upper Yukon area (0-50,250 fish). These guideline harvest levels were in effect during 1986-1988. No coho salmon guideline harvest level is in effect in the lower Yukon area. Coho salmon harvest levels are dependent on management action taken toward fall chum salmon. In each district, fishing frequency and duration is dependent on the Department's perception of the strength of the fall chum salmon return.

Chinook Salmon

Chinook salmon spawning populations are widely distributed throughout the Alaskan and Canadian portions of the Yukon River drainage. Major spawning streams in the Alaska portion of the Yukon Drainage include the Andreafsky, Anvik, Nulato, Salcha, and Chena Rivers. In the Canadian portion of the drainage (Yukon Territory), important chinook salmon systems include the Big Salmon and Nisutlin Rivers.

Total utilization (subsistence and commercial catch combined) of chinook salmon in the Yukon River has increased during the recent 5-year period as compared to prior years. In Alaska, for the period 1983-1987 total harvest (commercial and subsistence combined) averaged 175,000 fish, an increase of 6% compared to the previous 5-year average (1978-1982) of 165,000 fish (Tables 2 and 3). This increase was due to a 42% increase in subsistence catches from the 1978-1982 average as compared to the 1983-1987 average, while the average commercial catch during the same time period

decreased 6%. During these same periods Canadian total utilization of chinook salmon has increased 6% (Table 4).

Information obtained from scale pattern analysis and tagging studies indicates that primarily Canadian origin chinook salmon stocks have undergone increased exploitation in recent years resulting in escapements which will not maintain sustained yield. These high exploitation rates are the result of excessive chinook salmon harvests during recent years on runs of average magnitude. Unusually large returns during 1979-1981 set a trend for high harvest levels. Beginning in 1982 run strength dropped but harvests remained high.

In general, chinook salmon escapement trends, (index stream escapements) from 1976 through 1981 were consistently above other years (Table 6). Total utilization of the returns from these parent years has been in excess of that which can be sustained.

Summer Chum Salmon

Summer chum salmon are the more abundant of the two chum salmon runs that occur in the Yukon River. Summer chum salmon can be distinguished from fall chum salmon by the following characteristics: (1) earlier run timing (early June to mid-July in the lower river), (2) rapid maturation in fresh water, (3) smaller body size (6-7 pounds), (4) greater population size, and (5) spawning occurs primarily in lower 600 miles of the drainage.

The Anvik River supports the largest spawning population; other important spawning areas include the Andreafsky, Nulato, Rodo, Salcha, and Hogatza River drainages. Although runs fluctuate greatly in abundance from year to year, Yukon River summer chum salmon stocks have not experienced declining escapements (Table 7). Documented harvests and escapements during recent years show

minimum run sizes ranging from 1.2 to 5.6 million fish.

Total utilization of summer chum salmon has averaged over 800,000 fish annually (1978-1987) with the harvest during most years in excess of a million fish (Table 1). Average commercial related catches, including males taken during roe directed fisheries, decreased 9% during 1983-1987 as compared to those of 1978-1982, while subsistence catches increased 15% during the same time periods (Table 3). Since 1978, due to relatively poor flesh quality and the high cost of transportation of upriver summer chum salmon, a roe directed fishery has occurred primarily in Sub-District 4A. The average roe harvest taken during 1983-1987 was 194,000 pounds, 1.6 times greater than the average harvest taken from 1978-1982 (118,635 pounds roe).

Fall Chum Salmon

Fall chum salmon have the following differentiating characteristics from summer chum salmon: (1) later run timing (mid-July to early September in the lower river), (2) larger size (7-9 pounds), robust body shape, and bright silvery appearance in the lower river, (3) smaller population size, and (4) spawning that occurs in the upper portions of the drainage in spring fed streams.

Major spawning areas are located in the Porcupine River drainage (Sheenjek River in Alaska and Fishing Branch River in Canada), Chandalar River in Alaska, Tanana River drainage in Alaska (Toklat River, Delta River, and mainstem Tanana River upstream of Fairbanks) and the upper Yukon River drainage in Canada (Kluane River and mainstem Yukon River). Spawning occurs during September through November.

Tagging studies conducted in the 1970's indicated Porcupine River and upper Yukon River fall chum salmon are distinguished from

Tanana River fall chum salmon by their earlier run timing and their orientation along the north bank of the Yukon River in the Ruby area (mile 530-700), as opposed to the south bank orientation of Tanana drainage fall chum salmon.

In the lower Yukon area, the majority of the fall chum salmon are used for commercial purposes while in the upper Yukon area an increased proportion of fall chum salmon are used for subsistence. Increased total utilization (commercial and subsistence catch combined) of fall chum salmon in Alaska occurred through 1985. For the period 1981-1985, catches averaged 473,000 fish, an increase of 20% compared to the previous 5-year average (1976-1980) of 392,000 fish (Tables 2 and 3). This was due to an increase of 37% and 13% for subsistence and commercial fisheries, respectively. During these same periods Canadian total utilization of Yukon River fall chum salmon increased 93% (Table 4).

There was a serious decline in fall chum salmon escapements during 1982-1984 for most of the major spawning areas (Table 8). Average escapement in the Sheenjek, Fishing Branch, Toklat, and Delta Rivers for the period 1982-1984 were 40%, 60%, 59%, and 25%, below escapement objectives, respectively.

In response to poor fall chum salmon escapements in recent years, difficulties in assessing in-season run strength, and the increasing efficiency of the fleet, the Alaska Board of Fisheries adopted several regulatory restrictions beginning in 1983. Initially, these restrictions included a commercial fishery closure during late July in the lower Yukon area to protect the early portion of the run, establishment of a coastal "Set-Net-Only Area" which prohibited drift net operation, establishment of emergency order authority to implement fishing periods, and a reduction in commercial fishing time. For the 1986 season on a trial basis, and extended through the 1988 season by regulation, the Alaska Board

of Fisheries established a more restrictive Fall Chum Salmon Management Plan. These regulations provided for fishery closures by date at the end of the summer season, emergency order authority to establish seasons and fishing periods, reduced guideline harvest ranges, reduced commercial fishing time, and provided for no commercial fishing unless the run was determined to be average or better in magnitude.

Coho Salmon

Coho salmon escapement information is very limited. Comparative escapement information for this species is available only from the Tanana River drainage where escapements appear to have been relatively stable from 1977 to 1985 with increased escapements since 1986 (Table 9). The Delta Clearwater River near Delta Junction supports the largest known population of coho salmon within the Yukon drainage.

The commercial harvest of coho salmon in the lower Yukon area is dependent upon the timing and duration of the fall chum season. Coho migration in the lower river peaks during mid to late August. Coho salmon are taken incidentally to the fall chum fishery in most districts, but in some years contribute substantially to the commercial and subsistence harvests. Commercial catches in the Yukon area during the period 1982-1986 averaged approximately 47,500 coho salmon (Table 2). Approximately 38,000 cohos are also taken annually (1983-1987) for subsistence (Table 3).

1988 SEASON SUMMARY

Area Summary

In 1988, 1,474,204 salmon were commercially harvested in the Alaskan portion of the Yukon River (Table 5). The catch was

composed of 101,417 chinook salmon, 1,152,254 summer chum salmon, 133,921 fall chum salmon and 86,612 coho salmon (Table 5). Additionally, 256,486 pounds of summer chum salmon roe and 3,227 pounds of fall chum salmon roe were harvested. The chinook salmon catch was 21% below the recent 5-year average (1983-1987). The summer chum salmon catch and roe harvest were 1.9 and 1.3 times, respectively, greater than the recent 5-year average. The fall chum salmon harvest in Alaska was 27% below the 1983-1987 average. A record coho harvest was achieved which was 2.2 times greater than the recent 5-year average. The commercial harvest by Canada was a record of 13,217 chinook salmon which was 1.2 times greater than their recent 5-year average, and 30,263 fall chum salmon, 1.1 times greater than their recent 5-year average (Table 4).

Yukon River fishermen in Alaska received an estimated $13,379,800 for their catch, approximately 2 times greater than the recent 5-year average. Nine buyer-processors operated in the lower Yukon area, and 17 buyer-processors and seven registered catcher-sellers operated in the upper Yukon area of Alaska.

In 1988, lower Yukon fishermen received an average price of $2.97 per pound for chinook salmon, $0.66 per pound for summer chum salmon, $1.01 per pound for fall chum salmon, and $1.38 per pound for coho salmon. Upper Yukon commercial fishermen received an estimated per-pound average price of $1.04 for chinook salmon, $0.23 for summer chum salmon, $0.32 for fall chum salmon, $0.37 for coho salmon, and $4.35 for salmon roe.

Subsistence harvest information should be available in mid-February 1989 following data entry, analysis, and completion of draft reports. Subsistence "catch calendars" were mailed to each household in all Yukon River drainage communities in May 1988 for use during the 1988 fishing season. During the period September 1 to November 4, Subsistence Division staff visited each community

to collect catch calenders and administer a brief survey to all households identified during a pre-season survey as "fishing households." Additional catch calendars were received through the mail.

Approximately 1,509 fishing households were identified in 37 Yukon River communities. Project staff completed visits to 36 communities and obtained calendar returns or survey information from approximately 1,243 households, 82% of the fishing households identified. No fishing occurred in the community not surveyed due to high water conditions.

Management Considerations

The preseason outlook was for a below average return of chinook and fall chum salmon, an average to above average summer chum salmon return, and an above average coho salmon return.

The primary action taken by the Board of Fisheries following the 1987 season which had direct in-season fishery management implications included: (1) requirement of emergency order opening of District 4 between June 10 and June 25, and (2) development of a Tanana River (District 6) Management Plan. Impetus toward development of a Tanana River management plan involved documentation of large scale illegal sales of salmon and salmon roe harvested in accordance with subsistence fishing regulations.

In late May and early June of 1988, the Alaska Board of Fisheries met in Fairbanks in special session to take public and staff testimony on current and proposed salmon management practices on the Tanana River. After approximately two and a half days of testimony and deliberation, the Board of Fisheries rejected a proposal submitted by the Interior Fish and Wildlife Association which would have made numerous changes in regulation governing the

District 6 fishery. The essence of this proposal requested that fishing time be reduced by approximately 20%, that existing harvest limits (guideline harvest ranges) be repealed, and that transfer of additional fishermen into the Tanana River District not be allowed. Proponents of this proposal argued that the Tanana River was unique, that current management practices did not allow full utilization of the harvestable surplus, and that it should be managed as a terminal fishery. In lieu of the public proposal, the Board adopted regulations which reduced allowable commercial and subsistence fishing time from two 48-hour periods per week to two 42-hour periods per week, specified that there be no more than one 42-hour commercial fishing period per week during the fall season, and minimized abuse in the subsistence fishery by requiring subsistence fishing permits, catch limits, and in-season reporting requirements. In addition regulations were adopted which expanded rights of inspection of processing plants by enforcement personnel.

The Board of Fisheries refused to repeal the guideline harvest ranges as requested or to take other allocative action. Instead, the Board instructed the staff to manage the fishery on the basis of existing guideline harvest ranges instructing that these "quotas" are to be exceeded only if it can be determined that doing so would not jeopardize escapement or spawning ground requirements. Under these circumstances, there would be no ceiling on commercial catch levels. This management plan was adopted recognizing the need for flexibility and for discretionary use of emergency order authority.

Chinook Salmon

Chinook salmon migratory timing into the lower river appeared to be about average and summer chum salmon migratory timing was early. The mean Nome air temperature during April was 23 degrees fahrenheit (6 degrees fahrenheit warmer than the 1961-1987

average). The lower Yukon area was generally free of ice by May 20. The first chinook salmon was reported to have been captured May 27 in Sheldon's Point by a subsistence fisherman. The first chinook and summer chum salmon caught in Department test fishing nets occurred May 27 at south mouth. Department test nets were not deployed in middle mouth until June 1 or into north mouth until June 3 due to debris and high water. Catches of chinook and summer chum salmon began immediately after net deployment in middle mouth, however, north mouth summer chum and chinook salmon catches did not occur until June 7 and 8, respectively. The chinook and summer chum salmon return was primarily through south and middle mouths based on commercial and test net catches. Department test net catches of summer chum salmon increased rapidly while chinook catches remained at low levels until June 2, after which chinook salmon catches increased, indicating a trend of increasing run strength. The increase of chinook and summer chum salmon abundance was further documented by subsistence catch reports.

In response to early summer chum salmon run timing, special restricted mesh size fishing periods were implemented prior to and following the first unrestricted mesh size fishing periods in Districts 1 and 2. This allowed an earlier start of the commercial fishing season and an increased harvest of summer chum salmon than would have resulted from an unrestricted mesh size fishery directed at chinook salmon followed by a restricted mesh size fishery directed at summer chum salmon.

The directed fishery for chinook salmon was opened by emergency order after approximately nine days of increasing subsistence and test net catches in the lower Yukon River. The fishery was opened on a staggered basis: June 13 in District 1, June 15 in District 2, and June 19 in District 3. A fishing schedule of two 12-hour periods per week was established.

The unrestricted mesh size fishery for chinook salmon in Districts 1 and 2 occurred during three 12-hour fishing periods in each district. This was the least amount of fishing time directed for chinook salmon in the history of the fishery. The cumulative chinook salmon harvest for Districts 1 and 2 following the third District 2 unrestricted mesh size period was 60,338 fish. This harvest included the 7,537 chinook salmon taken during special restricted mesh size fishing periods directed at summer chum salmon prior to completion of the unrestricted mesh size fishing schedule. Through analysis of comparative test fishing data and sonar enumeration data, the chinook salmon return appeared below average in magnitude at this stage of the run. Mesh size restrictions (six inch or smaller mesh size) were implemented within the established fishing schedule and adjustments were made to fishing period duration which allowed seven additional restricted mesh size fishing periods in District 1 (five 12-hour periods, and two 24-hour periods), and six additional restricted mesh size fishing periods in District 2 (three 12-hour periods, and three 24-hour periods). During these restricted mesh size fishing periods 31,934 chinook salmon were harvested for a total restricted mesh size chinook salmon catch of 39,469 fish. The return of chinook salmon as evaluated by the lower river test net program and sonar enumeration study by July 6 indicated the return was about average in magnitude.

The total District 1 and 2 chinook salmon harvest was 92,270 fish, 3% above the midpoint of the guideline harvest range and 27% below the 1983-1987 average harvest. Primary areas of catch included Black River, and the coastal areas of south and middle mouths. In District 2, catches occurred primarily in the upper half of the district.

In District 3, two 12-hour unrestricted mesh size fishing periods and two restricted mesh size fishing periods (one 12-hour period

and one 24-hour period) were allowed 19-30 June. Fishing periods were established to occur simultaneously with District 2 commercial fishing periods to provide fishermen in the lower end of District 3 the convenience of selling fish to District 2 buyers. The initial delay in opening District 3 allowed the first segment of the chinook salmon return to pass through the district prior to the commercial fishery. In response to subsistence fishermen requests, the upper end of District 3 was closed June 26 to commercial fishing to allow increased subsistence fishing opportunities. A total of 1,767 chinook salmon was harvested in District 3, which was 12% below the midpoint of the guideline harvest range, and 30% below the recent five year average.

District 4 opened to commercial fishing by emergency order on June 19 on a twice weekly 48-hour fishing schedule. A total of 13 fishing periods occurred between June 19 and August 1 when the season closed by regulation. The commercial catch of 3,159 chinook salmon in District 4 was the highest on record. However, this relatively high catch is thought to be more a function of market demand and price rather than a reflection of run strength. In addition, failure of a buyer in this district to submit timely catch reports allowed the harvest to go several hundred fish higher than would have otherwise been allowed. Based on deliveries, the run peaked during the period which ended on July 8.

All subdistricts of District 5 opened by regulation on June 15. Subdistricts 5A, 5B, and 5C closed by emergency order July 6 and Subdistrict 5D closed by emergency order on July 14. Fishing periods in Subdistricts 5A, 5B, and 5C occurred primarily twice weekly during 48-hour periods, while Subdistrict 5D remained open to commercial fishing seven days per week. A total of 3,432 chinook salmon was reported by commercial fishermen in District 5. In an attempt to target the midpoint (2,600 fish) of the chinook salmon guideline harvest range for Subdistricts 5A, 5B, and 5C, the

last commercial opening was limited to 18 hours rather than the normal 48 hours. During the 48-hour closure prior to the last period, an apparently large group of chinook salmon entered the lower portion of the district. As a result, nearly 1,000 chinook salmon were taken during the last period in these subdistricts and the total catch for this area exceeded the midpoint of the guideline harvest range. In Subdistrict 5D, which is managed on the basis of a separate guideline harvest range (300-500 chinook salmon), the reported commercial harvest was 461 chinook salmon.

After the spring Board of Fisheries meeting, and prior to the arrival of salmon in the Tanana River (District 6), Commercial Fisheries Division staff met on two occasions with members of the Interior Fish and Wildlife Association and other Tanana River fishermen to discuss implementation of the newly adopted management plan. After much discussion, it was decided that the opening of the commercial season on the Tanana River would be delayed by approximately two and a half weeks from the date allowed by regulation. The intent of this plan was to allow the early portion of the chinook salmon run to pass through the district and on to spawning grounds. It was hoped that this strategy would result in chinook salmon escapement objectives in the Chena and Salcha Rivers being met and thereby eliminate the need for mid-season closures. Chinook salmon in the Tanana River commercial fishery are considered to be incidental to the more abundant and (collectively) more valuable summer chum salmon. It was considered less costly, and therefore preferable, to endure closures early in the season before summer chum salmon became abundant. This plan was implemented by emergency order and staggered openings of the commercial season were scheduled as follows: Subdistrict 6-A on July 1, Subdistrict 6-B on July 4 and Subdistrict 6-C on July 8.

In order to prevent the relatively low (600-800 fish) chinook salmon guideline harvest range from being taken and having the

season closed as a result, most buyers chose not to purchase chinook salmon. During previous years, chinook salmon sales according to public testimony have been grossly under-reported, however, stepped-up enforcement action by the Division of Fish and Wildlife Protection is thought to have ended this practice. Refusal by the majority of buyers to purchase chinook salmon is thought to have resulted in a significant, although yet undocumented, increase in the subsistence harvest.

A survey was flown of the Chena and Salcha Rivers on July 20 following two attempts under adverse survey conditions. This survey resulted in aerial estimates of 1,966 chinook salmon in the Chena River and 2,761 chinook salmon in the Salcha River which were acceptable escapement levels. For this reason, it became the position of the Department that any restrictions which might be imposed on the District 6 commercial or subsistence fishery would not relate to chinook salmon but would be based on conservation requirements of summer chum salmon. The District 6 chinook salmon harvest was 762 fish. The commercial harvest is not thought to be an accurate index of run strength.

In-season chinook salmon abundance indicators including lower river cumulative test net catches, sonar enumeration, Districts 4 and 5 cumulative commercial harvests, and reported subsistence catches, indicated a return of about average magnitude by July 6 in the lower Yukon area and July 15 in the upper Yukon area. However, the strength of chinook salmon spawning escapements in 1988 was variable between spawning areas in the lower, middle, and upper portions of the Yukon River drainage. Spawning escapements were generally near or above objective levels in the lower and middle Yukon River tributaries and below objective in Canadian spawning areas.

Spawning escapement survey counts of 1,448 chinook salmon for the West Fork Andreafsky River, 1,020 for the East Fork, and 1,637 for the Anvik River met the objectives for two of these spawning areas (Table 6). The East Fork Andreafsky River count was below objective, however, a counting tower estimate of 1,339 chinook salmon passage within this system indicates escapement in excess of the survey estimate. Counts of 1,061 chinook salmon for the North Fork and 714 for the South Fork of the Nulato River met the escapement objective of 500 fish for each fork. Historical survey data are sporadic for the Gisasa River in the Koyukuk River drainage, but 797 chinook salmon were counted by aerial survey in 1988. The escapement objective was met in the Chena River with a peak aerial estimate of 1,966 fish. However, the Salcha River peak aerial survey estimate count of 2,761 was 20% below the objective. The Chena and Salcha Rivers are the major chinook salmon producing streams in the Tanana Drainage.

In contrast to the Alaska portion of the drainage but similar though slightly improved from 1986 and 1987, chinook spawning escapements in Canadian Yukon tributaries were below desired levels. A total of 405 chinook was enumerated at the Whitehorse fishway which compared poorly with both the 1986 count of 541 and recent 5-year average of 670 fish (1983-1987). Aerial surveys of the principle index area of the Nisutlin River resulted in a peak count of 267 fish compared to the recent 5-year average of 535 chinook salmon.

With the exception of the Wolf River, surveys of other Teslin tributaries (Morley, Jennings, and Swift Rivers) were slightly below 1987 escapements. Unusual flood conditions on the Big Salmon River disrupted weir enumeration. However, comparisons made with aerial surveys and carcass counts against the weir in years where a complete weir count was obtained was used by DFO to make an estimate of the total weir passage. The weir passage estimate was

1,200 to 1,400 chinook salmon which represented a 20% to 40% increase over the 1987 weir count of 998 fish. The results of this enumeration technique were in contrast to comparisons of aerial survey counts which indicated that the 1988 escapement of 765 fish was 14% below that of the 1987 return. The Little Salmon peak aerial survey estimate during 1988 of 368 fish was 21% below the 1987 estimate, and 28% above the recent 5-year average. Chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River was estimated at 25,000 fish (preliminary) based on DFO mark - and - recapture study. This is above recent estimates for all years except 1983, although it is about 32% below the midpoint of the interim spawning escapement objective (33,000-43,000).

Summer Chum Salmon

In Districts 1 and 2, restricted mesh size fishing periods directed toward summer chum salmon were implemented prior to and following the first unrestricted mesh size chinook salmon directed fishing periods. These fishing periods of 6 and 12 hours duration were implemented in response to indications of an abundance of summer chum salmon while the chinook salmon return was in an early stage of development. During these restricted mesh size fishing periods, 174,209 summer chum salmon were captured in Districts 1 and 2 between June 9 and June 17. During unrestricted mesh size fishing periods during June 13 to June 23 in Districts 1 and 2, 220,974 summer chum salmon were harvested. Following the unrestricted mesh size season, twice weekly restricted mesh fishing periods occurred in Districts 1 and 2. Fishing periods were of 12 and 24 hours duration. During these periods, an additional 674,124 summer chum salmon were harvested. The total District 1 and 2 commercial summer chum salmon harvest was 1,073,370 fish, 96% above the recent 5-year average.

The District 1 and 2 summer chum salmon harvest through June 21 was approximately 370,000 fish, well in excess of any other year through that date. During this time period, it was not clear whether the summer chum salmon return was of early run timing and average in magnitude, or of average run timing and above average in magnitude. Therefore, when the twice weekly restricted mesh size fishing schedule was initiated fishing periods were maintained at 12 hours duration. This was a reduction in fishing time per period of 12 hours from prior years during this portion of the run. By June 23, it was apparent that the summer chum salmon return was above average in magnitude. Restricted mesh size fishing periods in District 1 and 2 during June 29 to July 7 were increased to 24 hour duration. Beginning July 7 in District 1 and July 10 in District 2, fishing periods were reduced to 12 hours in duration to increase Andreafsky River summer chum salmon escapements. On July 10, the closed water area of the Andreafsky River was extended for the same reason. The commercial fishing season closed July 15, 1988 by regulation.

The District 3 commercial fishery allowed for a 12 and a 24 hour restricted mesh size period following the two 12 hour unrestricted mesh size fishing periods. The commercial season closed June 30 as the chinook salmon harvest approached the lower end of the guideline harvest range. Summer chum salmon flesh quality was deteriorating at this time. The closure additionally provided subsistence fishermen an increased opportunity to harvest salmon. The District 3 summer chum salmon harvest was 13,965 fish, approximately 3 times greater than the recent 5-year average.

As has been the case in recent years, the summer chum salmon fishery in District 4 has been a roe directed fishery. A total of 254,487 pounds of summer chum salmon roe was commercially harvested during 13 fishing periods of primarily 48-hour duration each. Peak catches of summer chum salmon were made during the fishing period

which ended on July 5 which produced approximately 48,000 pounds of salmon roe. Only 24,000 summer chum salmon were exported from this district during 1988. Of the remaining chum salmon captured during the fishery, some were sold as dog food, some were retained by fishermen and used for subsistence purposes, and a large but undetermined number are unaccounted.

Summer chum salmon are of generally poor quality and are not abundant in District 5. During the 1988 season, approximately 700 summer chums were sold incidentally to the commercial fishery for chinook salmon.

The summer chum salmon fishery in District 6 (Tanana River) occurred coincidental to the chinook salmon fishery. Between July 1 and August 17, fourteen 42-hour fishing periods occurred. The commercial summer chum salmon catch was 40,183 fish, approximately 3% below the 1983-1987 average. As judged by commercial catches of summer chum salmon, it is estimated that the Tanana River run was of average magnitude. Empirical escapement data was not available, but observations by ADF&G staff in the Salcha River suggested large numbers of spawners in that drainage. Accordingly, the commercial season was extended for 2 additional fishing periods beyond the regulatory closing date of August 10.

Summer chum salmon spawning escapements ranged from below to above objective levels in 1988 (Table 7). The East Fork Andreafsky River tower count estimate of 68,937 summer chum salmon was 25% below the 1983-1987 average of 91,942 fish and 37% below the upper end of the aerial survey escapement objective range of 76,000 to 109,000 fish. An aerial survey count of 45,432 summer chum salmon for the West Fork Andreafsky River was well below the objective range of 62,000 to 116,000 fish. Sonar estimated escapement of 1,125,449 summer chum salmon in the Anvik River was 2.3 times greater than the escapement objective of 487,000 fish. The aerial survey count of

42,083 summer chum salmon for the Nulato River (both forks and mainstem combined) was 10% above the minimum escapement objective and 20% below the optimum escapement objective of 53,000 fish. High turbid water conditions in the Chena and Salcha Rivers prohibited evaluation of summer chum salmon escapements.

Fall Chum and Coho Salmon

The 1988 season was expected to be the third and final year of anticipated poor fall chum salmon returns. Poor escapements documented in 1982, 1983, and 1984 were thought to produce very poor returns in 1986, 1987, and 1988. Considering the Department's relative inability to accurately assess run strength and given the expectation of a poor return, the commercial fishery in the Alaskan portion of the drainage was managed conservatively.

Fall chum salmon migratory timing into the lower Yukon area was early. Commercial catch sampling during the last period of the summer season in District 1 on July 14 and 15 indicated a large proportion of the catch was composed of fall chum salmon. Subsistence and test net catches documented substantial numbers of fall chum salmon entering the river July 23 through 26. Coho salmon migratory timing into the lower Yukon area was about average. Consistent daily test net catches of coho salmon did not begin until August 5 with no significant entry occurring until August 8 and August 12-16.

The fall season commercial salmon fishery was opened by emergency order on August 8 in District 1 and August 10 in Districts 2 and 3. A fishing schedule of 12 hours duration in the coastal "Set Net Only Area" where tides further restrict fishing time, and of six hours duration in the remainder of District 1, and in Districts 2 and 3 was established. These fishing periods were announced on August 3 to provide processors and fishermen an opportunity to

prepare for the fishery. The cumulative sonar count at Pilot Station through August 2 was 225,000 fall chum salmon. In addition, during July 30-August 2 fall chum salmon catches near Galena (river mile 530) had been good. This data in comparison to data from other years indicated an available surplus of fall chum salmon, beyond spawning area and subsistence harvest requirements, was available.

During the first fishing period in Districts 1, 2, and 3 a total of 48,986 fall chum salmon and 11,102 coho salmon were captured. A harvest of fall chum salmon of this magnitude was about equal to the midpoint of the lower Yukon area guideline harvest range and similar to the pre-season projected harvest. These fishing periods coincided with the first significant entry of fall chum salmon into the Yukon River since announcement of the commercial fishing schedule.

To assure that a great enough portion of the fall chum salmon run would pass through the lower Yukon area to adequately contribute to: (1) escapement requirements, (2) subsistence harvest requirements, and (3) achievement of commercial harvest levels in upper Yukon districts proportional to lower Yukon area districts, it was warranted that fishing be postponed following the first fishing periods. This delay additionally allowed the Department time to further evaluate run strength and for the ratio of coho salmon to fall chum salmon within the districts to increase.

In order to spread the harvest across the run and to maintain adequate fish passage, scheduled fishing periods in District 1 were cancelled on August 11 and 15, in District 2 on August 14 and 24, and in District 3 on August 14. Harvest rates were significantly lower following the first commercial fishing period in each district. With each fishing period, the contribution of coho salmon to the total catch increased in all districts, and fishing

effort decreased in Districts 1 and 2. The commercial fishing season closed by emergency order in Districts 1, 2, and 3 on August 30, August 31, and August 22, respectively. The total lower Yukon area harvest was 79,480 fall chum salmon and 72,630 coho salmon. The preliminary cumulative sonar count at Pilot Station through termination of the project on September 14 was approximately 507,000 fall chum salmon and 264,000 coho salmon.

The summer chum and chinook salmon fishery in District 4 was closed on August 1 in order to evaluate the early portion of the fall run prior to allowing any commercial removal. Based on catches from the test fishwheel near Ruby and on subsistence catches, the run was judged to be early and somewhat stronger than anticipated. Accordingly, the commercial fishing season was reopened on August 7. Seven 48-hour periods were allowed prior to the season closure on August 30. The harvest of 15,662 fall chum salmon and 2 coho salmon was taken by 29 fishermen in Subdistricts 4-B and 4-C.

In subdistricts 5-A, 5-B and 5-C, two 24-hour commercial fishing periods were allowed (August 18-19 and August 20-21). A total of 14,200 fall chum salmon were taken by 16 fishermen. The fall commercial fishery in Subdistrict 5-D was opened on September 9 and closed on September 14. Three fishermen (one at Stevens Village and two near Circle) participated in the harvest and took approximately 2,800 fall chum salmon, and 8 coho salmon.

The fall chum salmon run in both Districts 4 and 5 showed a distinct bimodal pattern. At the Ruby test fishwheel, (mile 604) peaks occurred on August 11 and August 26.

Observations of test fishwheel and subsistence catches indicated that the first fall chum salmon were present in the Tanana River (District 6) in mid-August. Subsequent observations suggested that those first fall chum salmon were relatively few and that the run

consisted primarily of summer chum salmon until late August. The first of the three 24-hour commercial fishing periods was begun on September 9. Subsequent openings occurred on September 13 and September 20. Although comparative commercial catch data suggested that the 1988 fall chum salmon run was slightly below average to average magnitude, it was thought that the commercial guideline harvest ranges could be exceeded without jeopardizing subsistence needs or escapement requirements. The rationale behind this decision was that the 1988 level of subsistence fishing effort on the Tanana River was much reduced from previous years. It is thought that the recent loss of markets for subsistence-caught fish and roe was an important factor in this reduction of fishing effort.

The District 6 harvest of 21,790 fall chum salmon was 3% above the 1982-1986 average. The commercial coho salmon catch of 13,972 was a record harvest and was more than twice the recent 5-year average. It was clear throughout the duration of the fall run that the coho run was unusually strong. It was not possible to allow additional commercial harvest of coho salmon because of the overlapping timing with fall chum salmon and the possibility of overharvest of this species.

Fall chum salmon escapement information indicates returns to Tanana River spawning areas were above objective levels, with the exception of the upper Toklat River, while returns to the Chandalar, Sheenjek, and Fishing Branch Rivers, as well as to the mainstem Yukon within the Yukon Territory were below optimum levels (Table 8). The expanded fall chum salmon escapement estimate to the Delta River was 16,591 fish, approximately 51% above the escapement objective, and 28% above the recent five year average. Only 12,763 fall chum salmon were estimated in the upper Toklat area during 1988. This estimate is 61% below the escapement objective and 49% below the 1983-1987 average escapement.

Preliminary escapement estimates to the Chandalar and Sheenjek River were 33,617 and 45,000 fall chum salmon, respectively. No escapement objective has been established for the Chandalar River, however, the estimate is 40% below the 1986 and 1987 average estimated escapements. The Sheenjek River fall chum salmon escapement was 27% below the escapement objective and 50% below the 1983 to 1987 average. The Fishing Branch River escapement was estimated at 23,597 fall chum salmon which is 53% below the lower end of the interim escapement objective range (50,000-120,000 fish). Fall chum salmon escapement into the Canadian portion of the mainstem Yukon River as estimated by a DFO mark - and - recapture study was 36,569 fish. This estimate, although preliminary, is 59% below the lower end of the interim spawning escapement objective (90,000-135,000 fish) and 52% below the recent three-year average.

Limited coho salmon escapement information is obtained annually. Escapements were above average in areas surveyed (Table 9).

Outlook For 1989

Chinook Salmon

The majority of the chinook salmon returning to the Yukon River are 6-year old fish, however, 5 and 7-year old fish make a significant contribution to the run. Spawning area escapements during the 1983 brood year (age 6 in 1989) were judged to be below average to above average in magnitude as judged by comparative escapement information. Survival and production of the 1983 brood year is apparently average based on preliminary findings of a normal contribution of 5-year old fish to the 1988 commercial catch. It is expected that the 1989 return of 5-year olds (1984 brood year) will be above average based on about average escapements during 1984 and the above average number of 4-year old

fish in the 1988 commercial catch. The return of 7-year old fish (1982 year class) is expected to be below average, as the return of this year class in 1987 as 5-year-olds, and in 1988 as 6-year-olds was below average. Overall, the 1989 chinook salmon return is anticipated to be average in strength. The commercial harvest in Alaska (Districts 1-6) is expected to total 90,000 to 110,000 chinook salmon (85,000-103,000 fish in the lower Yukon area, 5,000-7,000 fish in the upper Yukon area).

Summer Chum Salmon

Summer chum salmon return primarily as 4-year old fish, although substantial 5-year old returns often result from brood years with high survival rates. The return of 4-year old fish in 1989 will be dependent on production from the 1985 brood year and survival of the resulting cohort. Based on available catch and escapement data, the magnitude of the 1985 summer chum salmon run was judged above average in abundance. The return of 5-year old fish in 1989 is expected to be above average in strength based on the above average return of 4-year old fish in 1988. The Anvik River summer chum salmon stock is expected to be the primary contributor to the 1989 return. In summary, based on evaluation of brood year run size data and assuming average survival, it is expected that the Yukon River summer chum salmon return in 1989 will be above average in magnitude. The commercial harvest is expected to be similar to the 1987 harvest (900,000-1,000,000 fish and 250,000 pounds of roe).

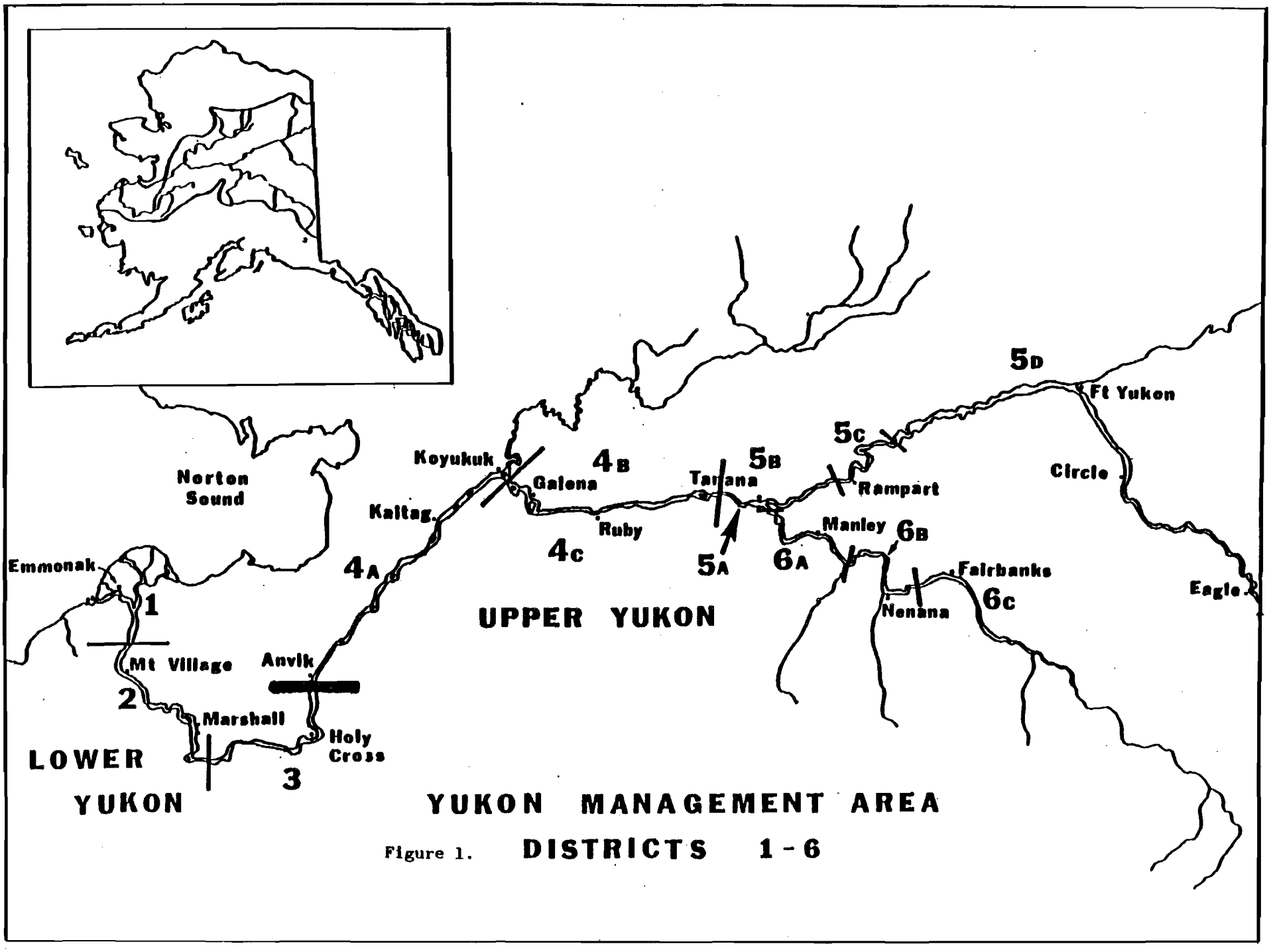
Fall Chum Salmon

Similar to summer chum salmon, fall chum salmon return primarily as 4-year old fish. Escapements in 1985 (which will produce 4-year old fish in 1989) were below average to above average in magnitude. The contribution of age 3 fish in the 1988 return was at least

average based on preliminary data suggesting an at least average return of 4-year old fish in 1989. The return of 5-year fish (1984 brood year) is expected to be below average based on the contribution of 4-year-olds to 1988 catches and below average escapements in 1984. In summary, based on evaluation of brood year escapements and assuming average survival, an average return of fall chum salmon is expected in 1989. A commercial harvest between 145,500 and 320,500 fish is anticipated (120,000-220,000 fall chum salmon in the lower Yukon area and, 25,500-100,500 fall chum and coho salmon combined in the upper Yukon area).

Coho Salmon

Coho salmon return primarily as 4-year old fish. Comprehensive escapement information for coho salmon is lacking, but escapement surveys in the Tanana River system indicated average run strength in 1985. The commercial harvest is expected to be 50,000-90,000 fish and will be dependent on the timing and frequency of fishing periods allowed for fall chum salmon.



YUKON MANAGEMENT AREA

Figure 1. DISTRICTS 1-6

Table 1. Total utilization (Alaska and Canada) of Yukon River salmon, 1961-1988.

Year	Chinook	Summer Chum [a]	Fall Chum [a,b]	Coho [a,b]	Total
1961	154,398	305,317	144,233	12,047	615,995
1962	119,781	261,856	140,401	32,456	554,494
1963	151,987	297,094	99,031	33,271	581,383
1964	117,226	361,080	128,707	14,633	621,646
1965	140,086	336,848	135,600	12,139	624,673
1966	109,339	154,508	122,548	32,446	418,841
1967	151,254	217,168	107,018	28,211	503,651
1968	123,674	148,350	97,552	24,916	394,492
1969	107,651	218,157	183,373	22,869	532,050
1970	97,682	303,510	265,096	17,154	683,442
1971	142,638	271,577	246,756	29,115	690,086
1972	118,827	243,674	188,178	29,765	580,444
1973	104,192	446,521	285,760	46,877	883,350
1974	123,684	817,703	383,552	28,423	1,353,362
1975	82,883	922,183	361,600	23,254	1,389,920
1976	110,607	787,766	228,717	10,425	1,137,515
1977	121,865	694,377	340,757	55,196	1,212,195
1978	135,346	1,266,290	340,816	33,939	1,776,391
1979	169,053	1,010,820	615,377	26,959	1,822,209
1980	219,255	1,288,284	488,305	28,903	2,024,747
1981	205,517	1,397,330	677,257	44,908	2,325,012
1982	168,710	839,238	373,175	73,070	1,454,193
1983	216,040	1,144,649	525,016	37,215	1,922,920
1984	178,827	1,040,299	412,322	130,960	1,762,408
1985	204,960	1,091,757	515,481	89,936	1,902,134
1986	165,272	1,371,187	318,321	81,723	1,936,503
1987	202,759	797,481	290,314	48,909	1,339,463
1988 [c]					
5 Yr Avg 1978-82	179,576	1,160,392	498,986	41,556	1,880,510
5 Yr Avg 1983-87	193,572	1,089,074	412,291	77,749	1,772,686

[a] Alaskan subsistence catches estimated for 1961-1976 since catches of salmon other than chinook salmon were not differeniated by species until 1977.

[b] Minimum estimates for 1961-1978 because subsistence surveys were typically conducted well before the end of the fishing season.

[c] Subsistence catch data not avalable until February, 1989.

Table 2. Alaskan commercial sales of Yukon River salmon, 1961-1988. [a]

Year	Chinook	Summer Chum		Fall Chum		Coho	Total	
		Numbers	Roe	Numbers	Roe		Numbers	Roe
1961	119,664	-	-	42,461	-	2,855	164,980	-
1962	94,734	-	-	53,116	-	22,926	170,776	-
1963	117,048	-	-	0	-	5,572	122,620	-
1964	93,587	-	-	8,347	-	2,446	104,380	-
1965	118,098	-	-	23,317	-	350	141,765	-
1966	93,315	-	-	71,045	-	19,254	183,614	-
1967	129,656	10,935	-	38,274	-	11,047	189,912	-
1968	106,526	14,470	-	52,925	-	13,303	187,224	-
1969	91,027	61,966	-	131,310	-	15,093	299,396	-
1970	79,145	137,006	-	209,595	-	13,188	438,934	-
1971	110,507	100,090	-	189,594	-	12,203	412,394	-
1972	92,840	135,668	-	152,176	-	22,233	402,917	-
1973	75,353	285,509	-	232,090	-	36,641	629,593	-
1974	98,089	589,892	-	289,776	-	16,777	994,534	-
1975	63,838	710,295	-	275,009	-	2,546	1,051,688	-
1976	87,776	600,894	-	156,390	-	5,184	850,244	-
1977	96,757	534,875	-	257,986	-	38,863	928,481	-
1978	99,168	1,052,226	25,761	236,383	10,628	26,152	1,413,929	36,389
1979	127,673	779,316	40,217	359,946	18,466	17,165	1,284,100	58,683
1980	153,985	928,609	139,106	293,430	5,020	8,745	1,384,769	144,126
1981	158,018	1,006,938	189,068	466,451	11,285	23,680	1,655,087	200,353
1982	123,644	461,403	152,819	224,187	805	37,176	846,410	153,624
1983	147,910	744,879	149,999	302,598	5,064	13,320	1,208,707	155,063
1984	119,904	588,597	167,224	208,232	2,328	81,940	998,673	169,552
1985	146,188	516,997	248,625	267,744	2,525	57,672	988,601	251,150
1986	99,970	721,469	271,691	139,442	577	47,255	1,008,136	272,268
1987	131,971	442,238	121,968	0	0	0	574,209	121,968
1988	101,417	1,152,254	256,486	133,921	3,227	86,612	1,474,204	259,713
5 Yr Avg 1983-87 Alaska	129,189	602,836	191,901	183,603	2,099	40,037	955,665	194,000
5 Yr Avg 1983-87 Lower Yukon	124,018	550,640	0	133,014	0	34,419	842,091	0
5 Yr Avg 1983-87 Upper Yukon	5,171	52,196	191,901	50,589	2,099	5,618	113,574	194,000

[a] Catches reported in numbers of fish sold in the round and pounds of unprocessed roe.

Table 3. Alaskan subsistence catch of Yukon River salmon, 1961-1988.

Year	Chinook	Summer Chum [a]	Fall Chum [a,b]	Coho [a,b]	Total
1961	21,488	305,317	101,772	9,192	437,769
1962	11,110	261,856	87,285	9,480	369,731
1963	24,862	297,094	99,031	27,699	448,686
1964	16,231	361,080	120,360	12,187	509,858
1965	16,608	336,848	112,283	11,789	477,528
1966	11,572	154,508	51,503	13,192	230,775
1967	16,448	206,233	68,744	17,164	308,589
1968	12,106	133,880	44,627	11,613	202,226
1969	14,000	156,191	52,063	7,776	230,030
1970	13,874	166,504	55,501	3,966	239,845
1971	25,684	171,487	57,162	16,912	271,245
1972	20,258	108,006	36,002	7,532	171,798
1973	24,317	161,012	53,670	10,236	249,235
1974	19,964	227,811	93,776	11,646	353,197
1975	13,045	211,888	86,591	20,708	332,232
1976	17,806	186,872	72,327	5,241	282,246
1977	17,581	159,502	82,771	16,333	276,187
1978	30,297	197,144	94,867	7,787	330,095
1979	31,005	196,187	233,347	9,794	470,333
1980	42,724	272,398	172,657	20,158	507,937
1981	29,690	208,284	188,525	21,228	447,727
1982	28,158	260,969	132,897	35,894	457,918
1983	49,478	240,386	192,928	23,895	506,687
1984	42,428	230,747	174,823	49,020	497,018
1985	39,771	264,828	206,472	32,264	543,335
1986	45,238	290,825	164,043	34,468	534,574
1987	53,124	275,914	245,834	48,603	623,475
1988 [c]					
5 Yr Avg 1983-87 Alaska	46,008	260,540	196,820	37,650	541,018
5 Yr Avg 1983-87 Lower Yukon	16,825	64,251	26,021	11,911	119,008
5 Yr Avg 1983-87 Upper Yukon	29,183	196,289	170,799	25,739	422,010

[a] Catches estimated for 1961-1976 since catches of salmon other than chinook salmon were not differentiated by species until 1977.

[b] Minimum estimates for 1961-1978 because surveys were typically conducted well before the end of the fishing season.

[c] Data not available until February, 1989.

Table 4. Canadian catch of Yukon River chinook and fall chum salmon, 1961-1988.

Year	Chinook			Fall Chum		
	Commercial	Non-Commercial [a]	Total	Commercial	Non-Commercial [a,b]	Total
1961	3,446	9,800	13,246	3,276	5,800	9,076
1962	4,037	9,900	13,937	936	8,500	9,436
1963	2,283	7,794	10,077	2,196	25,500	27,696
1964	3,208	4,200	7,408	1,929	10,258	12,187
1965	2,265	3,115	5,380	2,071	9,718	11,789
1966	1,942	2,510	4,452	3,157	10,035	13,192
1967	2,187	2,963	5,150	3,343	13,618	16,961
1968	2,212	2,830	5,042	453	11,180	11,633
1969	1,640	984	2,624	2,279	5,497	7,776
1970	2,611	2,052	4,663	2,479	1,232	3,711
1971	3,178	3,269	6,447	1,761	15,150	16,911
1972	1,769	3,960	5,729	2,532	5,000	7,532
1973	2,199	2,323	4,522	2,806	7,329	10,135
1974	1,808	3,823	5,631	2,544	9,102	11,646
1975	3,000	3,000	6,000	2,500	18,100	20,600
1976	3,500	1,525	5,025	1,000	4,200	5,200
1977	4,720	2,807	7,527	3,990	8,489	12,479
1978	2,975	2,906	5,881	3,356	6,210	9,566
1979	6,175	4,200	10,375	9,084	13,000	22,084
1980	9,500	13,046	22,546	9,000	13,218	22,218
1981	8,593	9,216	17,809	15,260	7,021	22,281
1982	8,640	8,268	16,908	11,312	4,779	16,091
1983	13,027	5,625	18,652	25,990	3,500	29,490
1984	9,885	6,610	16,495	22,932	6,335	29,267
1985	12,573	6,428	19,001	35,746	5,519	41,265
1986	10,797	9,267	20,064	11,464	3,372	14,836
1987	10,864	6,800	17,664	40,591	4,195	44,786
1988 [c]	13,217	6,746	19,963	30,263	2,553	32,816
5 Yr Avg 1983-87	11,429	6,946	18,375	27,345	4,584	31,929

[a] Indian Food Fish, Sport and Domestic fisheries combined.
[b] Includes small numbers of coho salmon taken at Old Crow.
[c] Preliminary estimates.

Table 5. Alaskan commercial catch of Yukon River salmon in 1988.

District Subdist.	No. of Fishermen	Chinook	Summer Chum		Fall Chum		Coho	Total Salmon	
			Numbers	Roe (lbs) [a]	Numbers	Roe (lbs) [b]		Numbers	Roe (lbs)
1	460	57,109	648,198	0	45,529	0	36,435	787,271	0
2	260	35,188	425,172	0	31,861	0	34,776	526,997	0
Subtotal	680	92,297	1,073,370	0	77,390	0	71,211	1,314,268	0
3	24	1,767	13,965	0	2,090	0	1,419	19,241	0
Total Lower Yukon	683	94,064	1,087,335	0	79,480	0	72,630	1,333,509	0
4 A	70	19	19,033	230,237	0	0	0	19,052	230,237
4 B,C	33	3,140	4,981	24,250	15,662	1,421	2	23,785	25,671
Subtotal District 4	97	3,159	24,014	254,487 [c]	15,662	1,421	2	42,837	255,908
5 A,B,C	34	2,971	722	353	14,217	0	0	17,910	353
5 D	4	461	0	0	2,772	0	8	3,241	0
Subtotal District 5	35	3,432	722	353	16,989	0	8	21,151	353
6	38	762	40,183	1,646	21,790	1,806	13,972	76,707	3,452
Total Upper Yukon	170	7,353	64,919	256,486	54,441	3,227	13,982	140,695	259,713
Total Yukon Area	853	101,417	1,152,254	256,486	133,921	3,227	86,612	1,474,204	259,713

[a] May include small amount of chinook salmon roe.
[b] May include small amount of coho salmon roe.
[c] 254,487 lbs of roe equals 254,487 females (1 lb roe/female). Including males not sold, it is estimated that 439,528 summer chum salmon were harvested during roe directed fishery.

Table 6. Chinook salmon escapement counts for selected spawning areas in the Yukon River drainage, 1959-1988. [a]

Year	Andreafsky		Anvik		Nulato	Chena	Salcha	Big Salmon	Nisutlin	Whitehorse Fishway	Canada Mainstem Tagging
	E. Fork	W. Fork	Aerial	Tower							
1961	1,003	-	1,226	-	543 d	-	2,878	-	-	1,068	-
1962	675 d	762 d	-	-	-	-	937	-	-	1,500	-
1963	-	-	-	-	-	137 d	-	-	-	484	-
1964	867	705	-	-	-	-	450	-	-	587	-
1965	-	355 d	650 d	-	-	-	408	-	-	903	-
1966	361	303	638	-	-	-	800	-	-	563	-
1967	-	276	336 d	-	-	-	-	-	-	533	-
1968	380	383	310 d	-	-	-	739	827 d	407	414	-
1969	231 d	274 d	296 d	-	-	-	461 d	286 d	105 d	334	-
1970	665	574 d	368	-	-	-	1,882	670	615	625	-
1971	1,904	1,682	-	-	-	193 d,e	158 d	200 d	650	856	-
1972	798	582 d	-	1,198	-	138 d,e	1,193	415	237	391	-
1973	825	788	-	613	-	21 d	391	75 d	36 d	224	-
1974	-	285	-	471 d	78 d	1,035 e	1,857	70 d	150 d	273	-
1975	993	301	-	730	204	316 e	1,055	153 d	249	313	-
1976	818	643	-	1,154	648	531	1,641	86 d	102	121	-
1977	2,008	1,499	-	1,371	487 d	563	1,202	316 d	77 d	277	-
1978	2,487	1,062	-	1,324	920	1,726	3,499	524	375	725	-
1979	1,180	1,134	-	1,484	1,507	1,159 d	4,789	632	713	1,184	-
1980	958 d	1,500	1,330	-	1,323 d	2,541	6,757	1,436	975	1,383	-
1981	2,146 d	231 d	807 d	-	791 d	600 d	1,237 d	2,411	1,626	1,539	-
1982	1,274	851 d	-	-	-	2,073	2,534	758	578	473	20,090
1983	-	-	653 d	-	1,006	2,553	1,961	540	701	905	29,289
1984	1,573 d	1,993	641 d	-	-	501	1,031	1,044	832	1,042	-
1985	1,617	2,248	1,051	-	2,780	2,553	2,035	801	409	536	11,030
1986	1,954	3,158	1,118	-	2,974	2,031 d	3,368	745	459 d	541	16,715
1987	1,608 d	3,141	1,174	-	1,638	1,312 d	1,898	891	275	327	13,210
1988	1,020	1,448	1,637	-	1,775	1,966	2,761	765	267	405	24,969 f

[a] Data obtained by aerial survey unless otherwise noted. Only peak counts are listed.
[b] Big Salmon Lake - Souch Cr.
[c] Sidney Cr. - 100 Mile Cr.
[d] Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.
[e] Boat survey.
[f] Preliminary estimate.

Table 7. Summer chum salmon escapement counts for selected spawning areas in the Yukon River drainage, 1973-1988. [a]

Year	Andreafsky			Anvik				
	E. Fork			Tower and				
	Aerial	Sonar	W. Fork	Aerial	Sonar	Nulato	Hogatza	Salcha
1973	10,149 b	-	51,835	86,665 b	-	-	-	-
1974	3,215 b	-	33,578	201,277	-	51,160	-	3,510
1975	223,485 b	-	235,954	845,485	-	138,495	22,355	7,573
1976	105,347	-	118,420	406,166	-	40,001 b	20,744	6,474
1977	112,722	-	63,120	262,854	-	69,660	10,734	677 b
1978	127,050	-	57,321	251,339	-	54,480	5,102	5,405
1979	66,471	-	43,391	-	280,537	37,104	14,221	3,060
1980	36,823 b	-	115,457	-	492,676	14,946 b	19,786	4,140
1981	81,555	147,312	-	-	1,479,582	14,348 b	-	8,500
1982	7,501 b	181,352	7,267 b	-	444,581	-	4,984 b	3,756
1983	-	110,608	-	-	362,912	21,012 b	28,141	716 b
1984	95,200 b	70,125	238,565	-	891,028	-	-	9,810
1985	66,146	-	52,750	-	1,080,243	29,838	22,566	3,178
1986	83,931	167,614 c	99,373	-	1,189,602	64,265	-	8,028
1987	6,687 b	45,221 c	35,535	-	455,876	11,257	5,669 b	3,657
1988	43,056	68,937 c	45,432	-	1,125,449	42,083	6,890	2,889 b

[a] Data obtained by aerial survey unless otherwise noted. Only peak counts are listed.
[b] Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.
[c] Tower count.

Table 8. Fall chum salmon escapement estimates for selected spawning areas in the Yukon River drainage, 1979-1988. a

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988 s
TANANA RIVER DRAINAGE										
Upper Toklat River b	96,550 d	23,054	13,907	3,309 e	15,105 e	15,861	21,824 d	12,708 d	18,350 d	12,763
Lower Toklat River	64,540	(2,140)	--	--	--	--	--	--	2,220	--
Upper Tanana River										
Benchmark #735 Slough	2,714	1,900 e	168 c	--	--	--	1,093	--	--	20
Delta River	8,125	4,637	22,375 e,g	3,433 e	7,230 e	12,327 e	17,276 h	6,703 h	21,180 h	16,591
South Bank Tanana i	20,820	3,444	7,063	--	1,350 c	2,150	975 c	1,610 c	--	7,000
Bluff Cabin Slough	6,875	3,190	6,120	1,156 e	12,715 e	4,017 e	2,655	3,458 e	9,395 e	4,481
One Mile Slough	3,850 c	885 c	632	--	1,115 c	560 c	366 c	1,949	2,500 e	1,520
Subtotal	42,384	14,056	36,358	4,589 j	22,410 j	19,054 j	22,365	13,720 j	33,075 j	29,612
Total Tanana Index	203,474	37,110	50,265	7,898 j	37,515 j	34,915 j	44,189	26,428 j	53,645 j	42,375
PORCUPINE RIVER DRAINAGE										
Sheenjek River	41,140	13,027	74,560 k	31,421 k	49,392 k	27,130 k	152,768 k	83,197 k	140,086 k	45,000 k
Fishing Branch River (YT)	44,080	20,319 c	10,549 j	5,846	10,000	5,570	56,016 l	31,378 l	48,956 l	23,597 l
Total Porcupine River	85,220	33,346	85,109 m	37,267 m	59,392 m	32,700 m	208,784 m	114,370 m	189,042 m	62,397 m
CHANDALAR RIVER	--	2,607	4,906 n,j	1,145 n	--	--	2,535 o	59,313 o,k	52,416 o,k	33,617 o,k
UPPER YUKON TRIBUTARIES										
Kluane River (YT)	4,640 e	3,150	25,806	5,378 e	8,578 e,j	7,200	7,538	16,686	12,000	6,950
Yukon River (YT) p	--	--	250 j	1,020	7,560	2,800	10,760	825	6,115	1,550
MAINSTEM YUKON CANADA (tagging)	--	--	--	34,780 r	90,875 r	--	62,010 r	87,990 r	80,776 r	36,569 r

a Data are peak aerial survey estimates rated fair to good unless otherwise indicated.
b Includes following areas: Toklat River in vicinity of Knights Roadhouse; Sushana River; Geiger Creek. Lower Toklat River counts are included in Total Tanana River Index for years 1979 and 1987.
c Poor survey.
d Combined aerial and ground surveys.
e Ground surveys.
g Peak aerial count was 10,664.
h Population estimate based upon replicate ground surveys.
i Richardson Highway to Blue Creek
j Incomplete, partial survey of index area(s).
k Bendix side scan sonar estimate. (For Sheenjek River -- includes expansion for uninsonified mid-river zone).
l Weir counts.
m Figure includes sonar or weir estimate and is not comparable on a year to year basis.
n Fair to poor survey rating.
o USFWS estimates.
p Vicinity of Ft Selkirk to Carmacks.
r Estimated total escapement to Canada (excluding Porcupine R.) from DFO tagging project.
s Very preliminary estimates (analysis still underway).

Table 9. Coho salmon escapement counts for selected spawning areas in the Yukon River drainage, 1972-1988. [a]

Year	Nenana River Drainage					Delta Clearwater River [d,e]	Clearwater Lake and Outlet	Richardson Clearwater River
	Lost Slough	Clear Creek	Wood Creek [b]	17 Mile Slough	Subtotal			
1972	-	-	-	-	-	632	417	454 g
1973	-	-	-	-	-	3,322	551 d	375 d
1974	1,388	-	-	27	1,415	3,954	560	652 d
1975	943	-	-	956	1,899	5,100	1,575 d,e	4 g
1976	118	13	-	281	412	1,920	1,500 d,e	80 g
1977	524	-	310 c	1,167	2,001	4,793	730 d,e	327
1978	350	-	300 c	466	816	4,798	570 d,e	-
1979	227	-	-	1,987	2,214	8,970	1,015 d,e	372
1980	499	-	1,603 c	592	1,091	3,946	1,545 d,e	611
1981	274	-	849 h	1,005	2,128	8,563 f	459 g	550
1982	-	-	1,436 h	-	1,436	8,365 f	-	-
1983	766	-	1,044 h	103	1,913	8,019 f	253	88
1984	2,677	2,600 b,e	8,805 h	-	14,082	11,061	1,368	428
1985	1,584	-	3,775 h	2,081	7,440	5,358	750	-
1986	794	605 b,e	1,664 h	218 g	3,281	10,857	3,577	146 g
1987	2,511	-	2,450 h	3,802	8,763	22,300	4,225 d,e	-
1988	348	-	2,046 h	-	2,394	21,600	825 d,e	-

[a] Only peak counts presented. Survey rating is fair-good unless indicated otherwise.
[b] Surveyed by F.R.E.D.
[c] Foot survey.
[d] Surveyed by Sport Fish.
[e] Boat survey.
[f] Population estimate.
[g] Poor survey.
[h] Weir count.